

A Web-based Watershed Planning Tool Aimed at Reducing Soil Erosion, Sedimentation and Pollutant Loadings to the Great Lakes

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May 21st, 2008



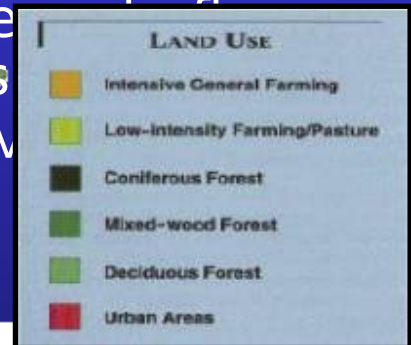
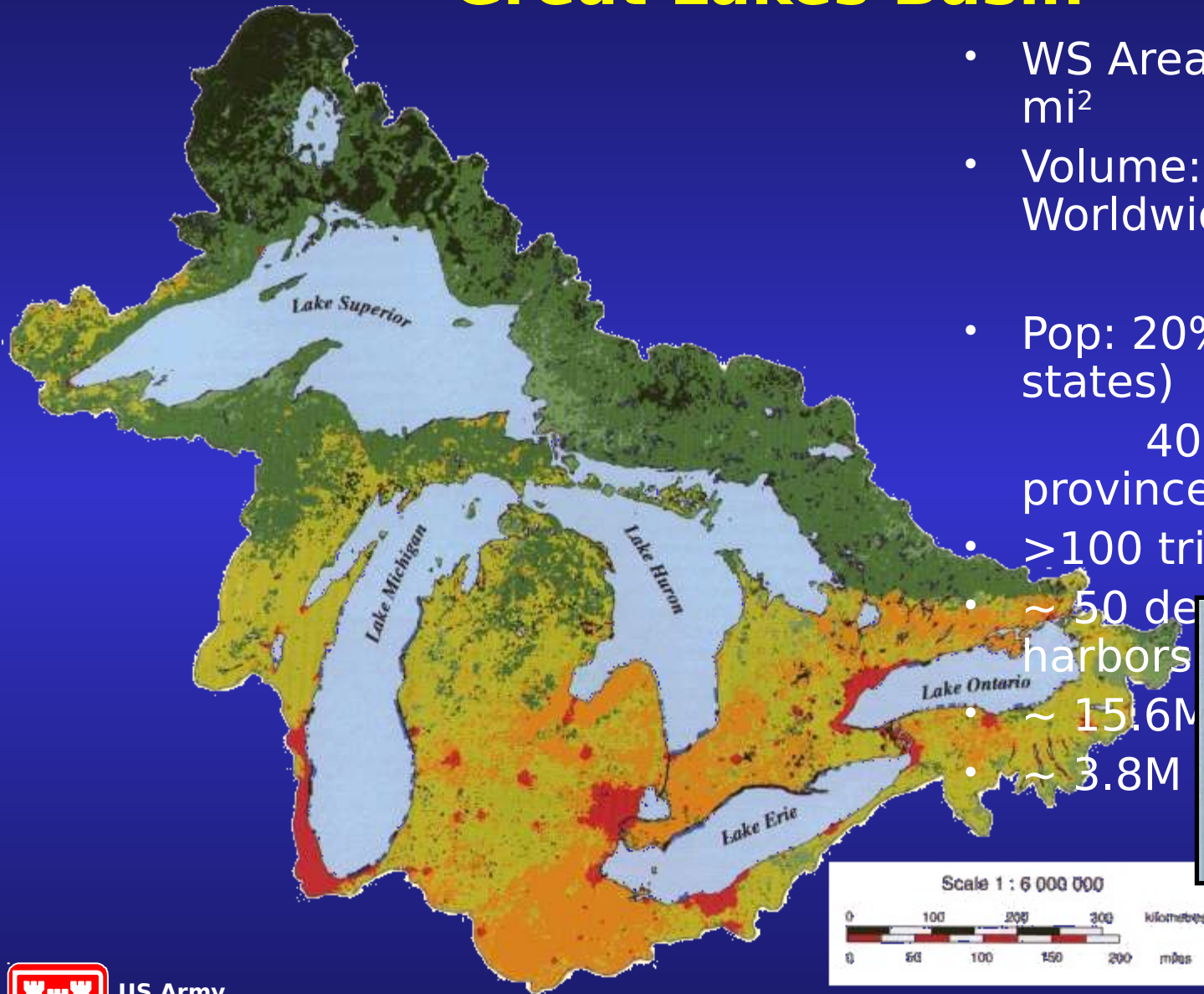
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Great Lakes Basin

- WS Area: ~ 300,000 mi²
- Volume: 20% Worldwide
- 95% U.S.
- Pop: 20% U.S (8 states)
- 40% CA (1 province)
- >100 tributaries
- ~ 50 deep harbors
- ~ 15.6M
- ~ 3.8M



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Great Lakes Tributary Modeling Program

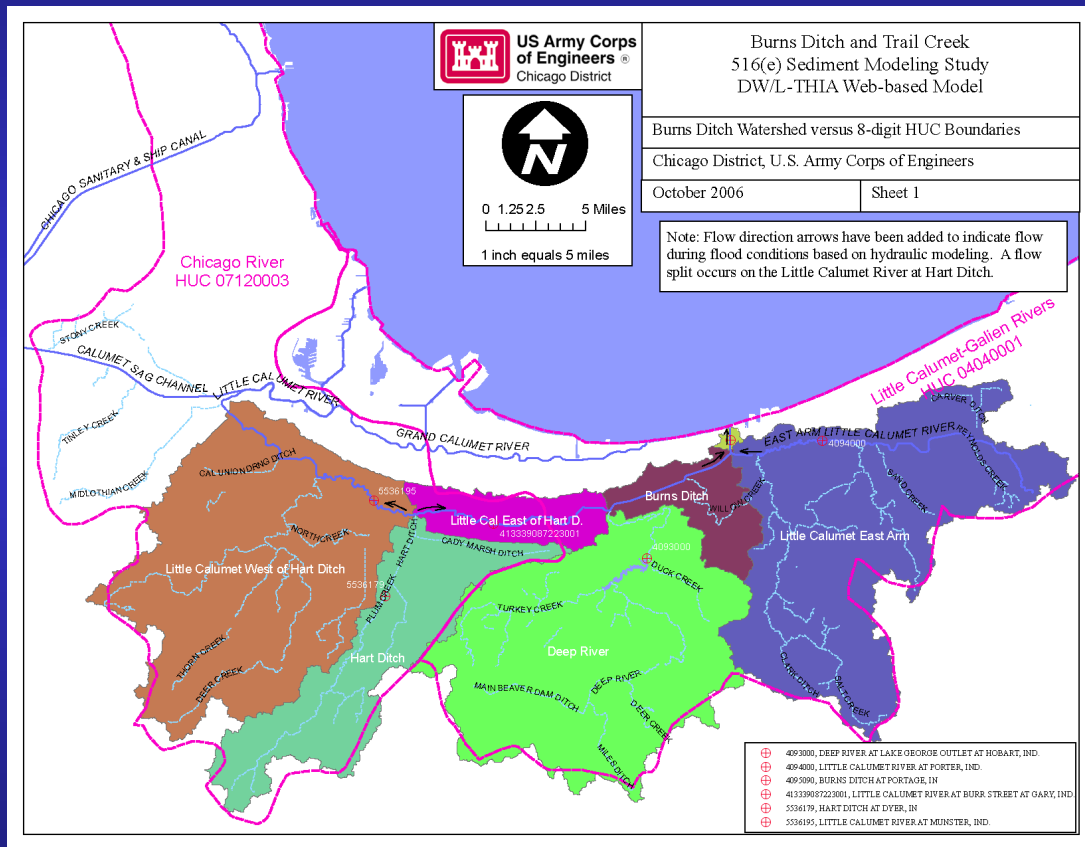
- Authority: Sect 516(e) WRDA 96 (as amended)
- Purpose: Develop sediment delivery/transport models for GL watersheds that drain to Fed channels or AOCs
- Goal: Reduce sediment/pollutant loads = reduced Fed costs to dredge/cleanup:
 - “Grass-roots” level initiative
 - Tailored tools (based on needs & users expertise)
 - Universal/non-proprietary tools
- Approach: 3 phases, typically 3 years per trib
 - Scoping: compile data, assemble WS team, select tool
 - Model Development: varies by WS, (OTS vs. custom)
 - Tech Transfer: training workshop, manuals, follow-



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Burns Ditch & Trail Creek Watersheds



Burns Ditch WS:

- 331 mi² / Lake Michigan
- Burns Wtwy/Harbor (Fed)
- Ag → Urban Landuse

Train Creek WS:

- 59 mi² / Lake Michigan
- Mich. City Harbor (Fed)
- Ag Landuse

Issues:

- Agricultural loadings
 - Developing watersheds
 - Chicago District
- Prioritize BMPs**



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Burns Ditch & Trail Creek Collaborative Watershed Study Team

- NW Indiana Regional Planning Commission
- Indiana Dept. of Natural Resources
- Indiana Dept. of Environmental Management
- Indiana Association of SWCDs
- USEPA Region V
- USFWS
- USDA – NRCS
- National Park Service
- USGS
- USACE – Chicago District
- Save the Dunes Council
- Great Lakes Commission



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Burns Ditch & Trail Creek Watershed Management System

Modeling Approach:

- Add functionality to two existing planning tools:
 - Area resource planners familiar w/ DW & L-THIA models
 - Both were web-GIS based w/ unique qualities
 - Easily updatable over time w/ newer data
- Contracted with Purdue and Michigan State Universities
 - MIPR through USGS State Water Resources

Research Institute Program



<http://water.usgs.gov/wrri/institutes.html>
Agricultural and Biological Engineering
Purdue University
Total Cost = \$120,000 + USGS fees
(<https://engineering.purdue.edu/ABE/>)



Institute of Water Research
Michigan State University
(<http://www.iwr.msu.edu/>)



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Burns Ditch & Trail Creek Watershed Management System

Major Tasks Accomplished:

- Update data from available sources (landuse, topo, etc.)
- Interconnect web-models (pass data & results)
 - Digital Watershed (DW)
 - Long-Term Hydrologic Impact Assessment (L-THIA)
- Update sediment delivery rates using SWAT-based MUSLE
- Create new interface for Burns Ditch / Trail Creek
- Add additional non-agricultural BMPs
- Create video tutorials, exercises and documentation
- Conduct hands-on training workshop
- Revising based on feedback from users
- Currently adding Low Impact Development (LID)



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Program Website & Main User Entry Point

www.glc.org/tributary/models/burns-trail.html

<http://danpatch.ecn.purdue.edu/~eqip/erosion/>

Burns Ditch and Trail Creek - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://www.glc.org/tributary/models/burns-trail.html>

Great Lakes Tributary Modeling Program

models about sedimentation links publications faq

models

Overview
Model Development
Model Types
Data Requirements

Completed Models:
Buffalo River (NY)
Burns Ditch/Trail Ck (IN)
Clinton River (MI)
Grand River (MI)
Menomonee River (WI)
Mill/Cascade (PA)
Nemadji River (MN, WI)
Saginaw River (MI)
St. Joseph River (MI, IN)

Additional Tributaries:
coming soon.

related publications

NEW Summary from Burns Ditch/Trail Creek Training Workshop (Dec. 2006) (0.5 mb)

Scoping Reports:
Burns Ditch (1.8 mb)
Trail Creek (0.3 mb)

Summary from Burns Ditch/Trail Creek Stakeholders Meeting (Nov. 2005) (0.1 mb)

Burns Ditch Fact Sheet (0.2 mb)

Trail Creek Fact Sheet (0.2 mb)

Burns Ditch and Trail Creek (Indiana)

Project Status: modeling is complete



Mouse-over to view tributary flow.

Due to the similarity and proximity of the Burns Ditch and Trail Creek watersheds in northern Indiana, the Corps of Engineers will develop one model for both watersheds.

River Basin Characteristics

The Burns Ditch (a man-made waterway) and Trail Creek watersheds discharge to Lake Michigan at Burns Waterway Harbor in Portage and Michigan City Harbor, respectively. The Burns Ditch basin includes portions of Porter, Lake, and La Porte counties, and covers 331 square miles. Major sub-tributaries to the Burns Ditch include the East and West Branches of the Little Calumet River, Deep River, and Turkey Creek. The Trail Creek basin falls entirely within La Porte County and covers approximately 59 square miles. Major sub-tributaries to Trail Creek include the East and West Branches, Wolf Run, and Waterford Creek.

Land use within the two watersheds is primarily agricultural, with some forested, urban, and industrial areas. Within the Burns Ditch basin, the East Branch of the Little Calumet River is a main source of sediment due to high agricultural use. Urban development in the upstream portions of the basin contributes to elevated levels of sedimentation in Lake George, a manmade lake created by the City of Hobart in the mid-1800s. The Lake George Dam also has important effects on the river reach located downstream of the lake. As a result, dredging has been conducted along the East Branch of the Little Calumet River and in Lake George at an expense of more than \$2 million. Similarly, in the Trail Creek basin, the Federal navigation channel at Michigan City acts as a sediment trap requiring frequent maintenance dredging.

Modeling Approach

The Corps has contracted with the Michigan State University (MSU) Institute of Water Research and Purdue University - Agricultural and Biological Engineering to expand the capabilities of an existing web-based land use planning system to create an enhanced, user-friendly watershed analysis tool specific to the Burns Ditch and Trail Creek watersheds. This new tool integrates the capabilities of MSU's Digital

issues and concerns

- Sedimentation in Lake George (in the Burns Ditch basin) required \$90,000 cubic yards of dredging in 2000.
- Sediment contaminants of concern in the East Branch of the Little Calumet River include nickel, cobalt, and lead.

Burns Ditch & Trail Creek Watershed Management System - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Address <http://danpatch.ecn.purdue.edu/~eqip/erosion/>

Getting Started Latest Headlines mapserver projects at ... Digital Watershed - Onli... Watershed Delineation ...

BURNS DITCH & TRAIL CREEK WATERSHED MANAGEMENT SYSTEM



As part of the Great Lakes Tributary Modeling Program, the Chicago District of the U.S. Army Corps of Engineers, Michigan State University, and Purdue University have developed a watershed management system. The management system allows stakeholders who are actively engaged in planning and other stakeholders who support planning in the Burns Ditch and Trail Creek watersheds to conduct preliminary assessments. Specifically, stakeholders can obtain an overview of the two watersheds using a map service and generate land use and impervious surface estimates. Second, stakeholders can assess before and after consequences of applying soil conservation and non-point source pollution measures to agricultural lands or land use changes (e.g. agricultural land to residential). Third, hydrologists may use a model to design a number of erosion and sediment control structures.

The Burns Ditch and Trail Creek Watershed Management System includes the two named watersheds which drain into Lake Michigan and incorporated areas within three northwestern counties of Indiana: Lake, Porter, and La Porte. For more information regarding the Great Lakes Tributary Modeling Program and other tributary modeling efforts, please go to <http://glc.org/tributary/>, the program's website.

Start with the following applications:

1. **Burns Ditch & Trail Creek Web-GIS erosion and hydrologic modeling system (RUSLE enabled)**
Use this system to estimate the sediment, water quantity, and water quality impacts of applying agricultural best management practices (BMPs) or changing land use in a watershed.
2. **Web-GIS based EQIP scoring system for BMP assessment**
Use this system to identify resource concerns in agricultural fields and estimate the effectiveness and costs of agricultural best management practices (BMPs) in mitigating the identified resource concerns. The resource concerns, BMPs, and summary output follow the guidelines of Indiana's Environmental Quality Incentives Program. The Natural Resources Conservation Service manages this program.
3. **Project entry from Digital Watershed**
User can initiate the Web-GIS modeling project using this link from Digital Watershed hosted at Michigan State University, where additional GIS data are available, such as gaging stations, permit compliance system, industrial facilities discharge sites, etc. Data are organized in 8-digit watershed.



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Burns Ditch & Trail Creek Watershed Management System - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://.../mapserver/mapserv.cgi?map=%2Fhome%2Fdanpatch%2F... Google

Getting Started Latest Headline Digital Watershed - Onli... Watershed Delineation ...

Burns Ditch & Trail Creek Wat... Burns Ditch & Trail Creek ...

Layer Selection

BACKGROUND

- ☒ None
- ☐ Aerial Photo (color)
- ☐ Aerial Photo (b&w)
- ☐ Topographic Map (USGS Quad)
- ☐ Land Use
- ☐ DEM
- ☐ Hydro. Soil Gr...

FOREGROUND

- ☐ Data extent
- ☒ Burns Ditch Watershed
- ☒ Trail Creek Watershed
- ☐ Subwatersheds
- ☐ Flowpath from DEM
- ☒ Streams & Rivers
- ☐ Lakes
- ☒ Highways
- ☐ Railroads
- ☐ County Roads
- ☒ County Boundary
- ☐ Census Urbanized Area
- ☐ Metro Boundary

Burns Ditch & Trail Creek Watershed Management System

Click Outlet and Run WD

Zoom out

Box zoom in

Pan

Full extent

Legend

- Highways
- County
- Trail Creek Watershed
- Burns Ditch Watershed
- Stream

[Printable Map](#)

Metadata

Find map from Digital Watershed by address :

Street Address:

City:

State: IN

Zip Code:

Scale=1:382200

[Help](#) [\[Home\]](#) [\[E-mail\]](#)

Applet rosa_applet started

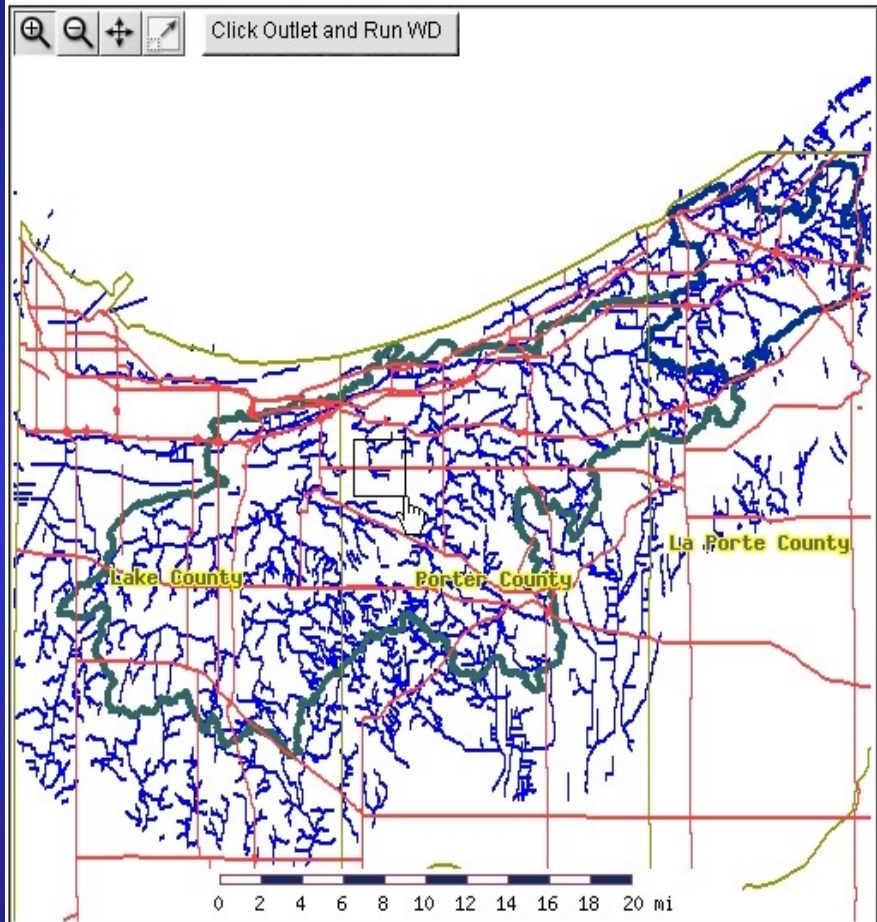


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Find stream and delineate watershed...

Burns Ditch & Trail Creek Watershed Management System



Scale=1:382200

Burns Ditch & Trail Creek Watershed Management System



Scale=1:9800



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Review watershed data and estimate current sediment...

Burns Ditch & Trail Creek Wat... Burns Ditch & Trail Creek ...

Watershed Summary and Tools

[*NOTE: all links open in new window]

Total watershed Area: 770.3 (acres)		
Land use	Soil group	Area(acres)
Water	B	0.9
Commercial	B	0.4
Commercial	C	3.4
Agriculture	B	43.2
Agriculture	C	659.9
LD-Residential	B	2.7
LD-Residential	C	10.3
Grass/Pasture	B	0.4
Grass/Pasture	C	18.7
Forest	B	7.4
Forest	C	21.4
Industrial	C	0.7
Total Area		770.3

Modeling Toolbox

View watershed/Apply BMPs	Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply structural BMPs in the watershed.
Estimate sediment	Use this tool to estimate long-term average annual sediment yield (tons/year) from the watershed using the Revised Universal Soil Loss Equation (RUSLE) and the sediment delivery ratio approach.
Estimate Imperviousness	Use this tool to estimate percent imperviousness in the watershed.
Estimate Peak Runoff	Use this tool to estimate the peak runoff (computed using the SCS CN method) and peak runoff concentration (using the Kirpich method) for a corresponding rainfall depth for the watershed.
Run L-THIA Model	The Long-Term Hydrologic Impact Assessment (L-THIA) estimates average annual runoff and sediment levels in the watershed.
Run SEDSPEC Model	The Sediment and Erosion Control SPECification Information and Design (SEDSPEC) tool is used to design a channel, culvert, sediment diversion, or low water crossing.

SCIENCE-BASED Watershed Management

Total sediment estimated for this watershed is 148.6 tons per year.

[Additional information](#) on how total sediment was estimated.

Download data for the delineated watershed [Metadata](#)

- Watershed data (boundary, landuse raster etc) from this site (Purdue ABE)



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Review watershed and apply BMPs...

Burns Ditch & Trail Creek Wat... Burns Ditch & Trail Creek ... Burns Ditch & Trail Creek Sub-...

Watershed Summary and Tools

[*NOTE: all links open in new window]

Total watershed Area:		770.3 (acres)
Land use	Soil group	Area(acres)
Water	B	0.9
Commercial	B	0.4
Commercial	C	3.4
Agriculture	B	43.2
Agriculture	C	659.9
LD-Residential	B	2.7
LD-Residential	C	10.3
Grass/Pasture	B	0.4
Grass/Pasture	C	18.7
Forest	B	7.4
Forest	C	21.4
Industrial	C	0.7
Total Area		770.3

Modeling Toolbox

View watershed/Apply BMPs	Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply structural BMPs in the watershed.
Estimate sediment	Use this tool to estimate long-term average annual sediment yield (tons/year) from the watershed using the <u>R</u> evised <u>U</u> niversal <u>S</u> oil <u>L</u> oss <u>E</u> quation (RUSLE) and the sediment delivery ratio approach.
Estimate Imperviousness	Use this tool to estimate percent imperviousness in the watershed.
Estimate Peak Runoff	Use this tool to estimate the peak rate of runoff, depth of runoff (computed using the SCS CN method), computed time of concentration (using the Kirpich formula), and the corresponding rainfall depth for the watershed.
Run L-THIA Model	The <u>L</u> ong- <u>T</u> erm <u>H</u> ydrologic <u>I</u> mpact <u>A</u> ssessment Model estimates average annual runoff and nonpoint source pollutant levels in the watershed.
Run SEDSPEC Model	The <u>S</u> ediment and <u>E</u> rosion Control Planning, <u>D</u> esign and <u>S</u> PECification Information and Guidance tool allows user to design a channel, culvert, sediment basin, level terraces, runoff diversion, or low water crossing for the watershed.

Download data for the delineated watershed [Metadata](#)

- [Watershed data \(boundary, landuse raster etc\) from this site \(Purdue ABE\)](#)



Review watershed and activate online digitizing

Burns Ditch & Trail Creek Wat... Burns Ditch & Trail Creek water... Burns Ditch & Trail Creek Sub-... Burns Ditch & Trail Creek ...

Burns Ditch & Trail Creek Watershed Management System: Watershed Delineation Map Interface

Layer Selection

BACKGROUND

- ☐ None
- ☒ Aerial Photo (color)
- ☐ Aerial Photo (b&w)
- ☐ Topographic Map (USGS Quad)
- ☐ Land Use
- ☐ DEM
- ☐ Hydro. Soil Group

FOREGROUND

- ☐ Burns Ditch Watershed
- ☐ Trail Creek Watershed
- ☐ Subwatersheds
- ☒ Flowpath from DEM
- ☒ Streams & Rivers
- ☒ Lakes
- ☐ Highways
- ☐ Railroads
- ☒ County Roads
- ☐ County Boundary
- ☐ Census Urbanized Area
- ☐ Metro Boundary

User-delineated watershed layers

BACKGROUND

- ☐ None
- ☒ Land Use
- ☐ Hydro. Soil Group
- ☐ Curve Number Map

FOREGROUND

- ☒ Watershed Boundary

Legend

- Local Roads
- Flowpath
- Lakes
- Stream
- Watershed boundary
- Water
- Commercial
- Agriculture
- High density residential
- Low density residential
- Pasture/Grass
- Forest
- Industrial
- Aerial Photo (color)

Printable Map

Index Map

Scale=1:16700

Appllet rosa_appllet started



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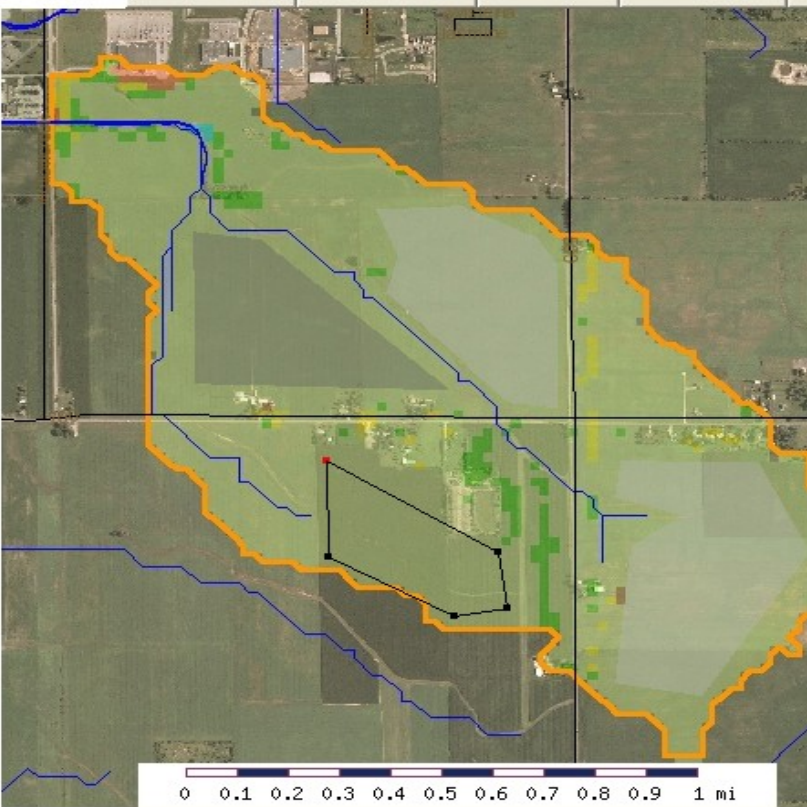
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Use the online digitizing tool to apply ag-BMPs...

Burns Ditch & Trail Creek water... Burns Ditch & Trail Creek ...

Online Web-GIS Digitizing Tool [\[Help\]](#)

Edit	Select	Erase	Review	Erase All
Draw	Rectangle	Circle	Line	Polygon
View	Zoom In	Fit Window	1 to 1	Zoom Out



Area(acre): 41.5

Cancel Apply

Java Applet Window

[Learn how to use this tool](#)

[GIF slides version](#)

[HTML version](#)

Applet MapViewer started

Apply landuse and/or ...

Land Use:

- No Landuse Change
- Commercial
- Industrial
- High Density Residential
- Low Density Residential
- Water/Wetlands
- Grass/Pasture
- Agricultural**
- Forest

Erosion BMP:

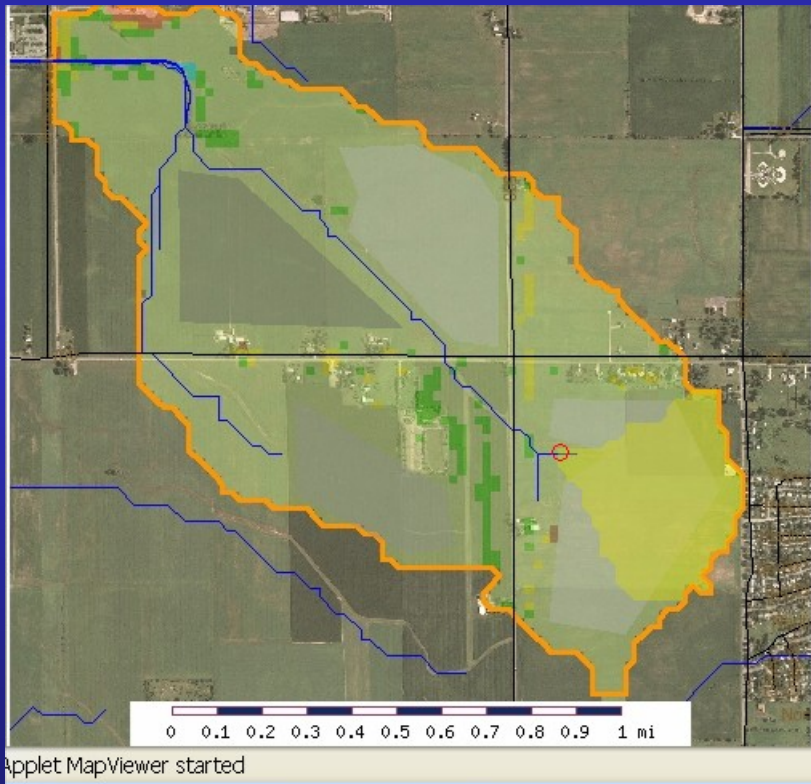
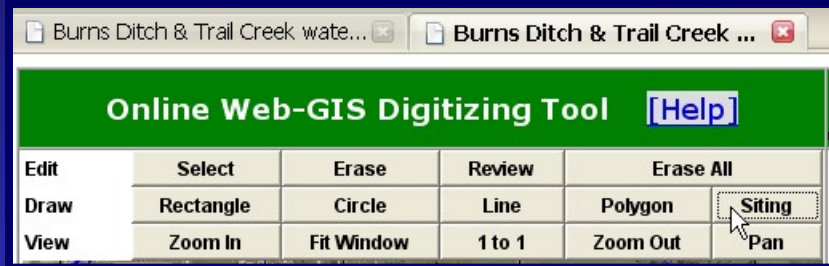
- No BMP
- Ag-No Till
- Ag-Conservation Tillage**
- Ag-Reduced Till
- Ag-Conventional Till
- Riparian Buffer Strip
- Sediment Basin
- Grassed Waterways



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Use the online digitizing tool to apply structural BMPs...



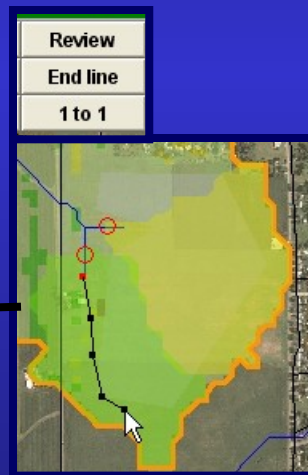
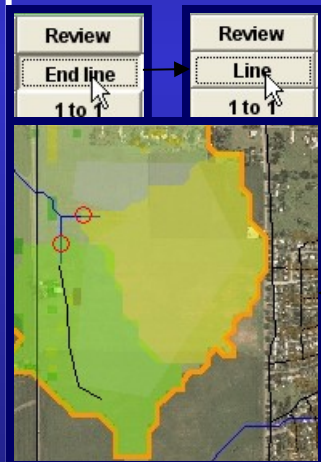
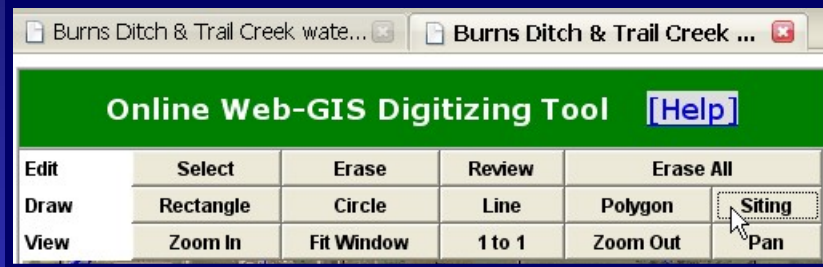
Sediment Basin



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Use the online digitizing tool to apply structural BMPs...



Grassed Waterway



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Review changes and estimate sediment after landuse changes and BMP implementation...

Burns Ditch & Trail Creek water... Burns Ditch & Trail Creek ...

Watershed Summary and Tools

Land use before and after modification					
Land use	Soil group (Before)	Soil group (After)	Area(acres) (Before)	Area(acres) (After)	Area(acres) (Difference)
Water	B	B	0.9	0.9	0
Commercial	B	B	0.4	0.4	0
Commercial	C	C	3.4	3.4	0
Agriculture	B	B	43.2	43.2	0
Agriculture	C	C	659.9	660.7	+0.7
LD-Residential	B	B	2.7	2.7	0
LD-Residential	C	C	10.3	10.3	0
Grass/Pasture	B	B	0.4	0.4	0
Grass/Pasture	C	C	18.7	18.7	0
Forest	B	B	7.4	7.4	0
Forest	C	C	21.4	21.2	-0.1
Industrial	C	C	0.7	0.2	-0.5
Total area(ac)			770.1	770.1	0

Modeling Toolbox

- View watershed/Apply BMPs** Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply structural BMPs in the watershed.
- Estimate sediment w/ BMP** Use this tool to estimate long-term average annual sediment yield (tons/year) from the watershed using the Revised Universal Soil Loss Equation (RUSLE) and the sediment delivery ratio approach.
- Estimate Imperviousness** Use this tool to estimate percent imperviousness in the watershed.
- Estimate Peak Runoff** Use this tool to estimate peak runoff from the watershed.
- Run L-THIA Model** The L-THIA model estimates sediment levels in the watershed.
- Run SEDSPEC Model** The SEDSPEC model estimates sediment design loading and diversification.

SCIENCE-BASED Watershed Management

Total sediment estimated for this watershed after you applied these BMPs is 137.4 tons per year. It was 148.6 tons per year before. So you reduced total sediment loadings by 11.1 tons per year.

[Additional information](#) on how total sediment was estimated.

Download data for the delineated watershed [Metadata](#)

- Watershed data (boundary, landuse raster etc) from this site (Purdue ABE)

Watershed Delineation Program by Tong Zhai, Bernard A. Engel, Rick Farnsworth



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Estimate watershed imperviousness...

Watershed Summary and Tools

Land use before and after modification					
Land use	Soil group (Before)	Soil group (After)	Area(acres) (Before)	Area(acres) (After)	Area(acres) (Difference)
Water	B	B	0.9	0.9	0
Commercial	B	B	0.4	0.4	0
Commercial	C	C	3.4	3.4	0
Agriculture	B	B	43.2	43.2	0
Agriculture	C	C	659.9	660.7	+0.7
LD-Residential	B	B	2.7	2.7	0
LD-Residential	C	C	10.3	10.3	0
Grass/Pasture	B	B	0.4	0.4	0
Grass/Pasture	C	C	18.7	18.7	0
Forest	B	B	7.4	7.4	0
Forest	C	C	21.4	21.2	-0.1
Industrial	C	C	0.7	0.2	-0.5
			Total area(ac)	770.1	770.1

BMP applied		Area (ac)
Ag-No Till	Applied to an area of 68.5	
Ag-Reduced Till	Applied to an area of 65.6	
Ag-No Till	Applied to an area of 88.6	
Ag-Conservation Tillage	Applied to an area of 41.5	
Sediment Basin	Contributing subwatershed area:76.6	
Grassed Waterways	Contributing subwatershed area:68.5	

Watershed Delineation Program by Tong Zhai, Bernard A. Engel, Rick Farley

Modeling Toolbox

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- Estimate Imperviousness**: Use this tool to estimate percent imperviousness in the watershed.
- Estimate Peak Runoff**: Use this tool to estimate the peak rate of runoff, depth of runoff (computed using the SCS CN method), computed time of

Impervious Area within the newly delineated watershed

Current land use and impervious area			
Watershed Area	770.1 (acres)		
Land Use	Soil Group	Area (acres)	Impervious Area (acres)
Water	B	0.9	0
Commercial	B	0.4	0.2
Commercial	C	3.4	2.4
Agriculture	B	43.2	0.8
Agriculture	C	659.9	12.5
LD-Residential	B	2.7	0.4
LD-Residential	C	10.3	1.5
Grass/Pasture	B	0.4	0
Grass/Pasture	C	18.7	0.3
Forest	B	7.4	0.1
Forest	C	21.4	0.4
Industrial	C	0.7	0.3
Total Area		770.1	18.9

The impervious area in the watershed is 18.9 acres or 2.45 % of the watershed area with the current land use.

Modified land use and impervious area			
Watershed Area	770.1 (acres)		
Land Use	Soil Group	Area (acres)	Impervious Area (acres)
Water	B	0.9	0
Commercial	B	0.4	0.2
Commercial	C	3.4	2.4
Agriculture	B	43.2	0.8
Agriculture	C	660.7	12.5
LD-Residential	B	2.7	0.4
LD-Residential	C	10.3	1.5
Grass/Pasture	B	0.4	0
Grass/Pasture	C	18.7	0.3
Forest	B	7.4	0.1
Forest	C	21.2	0.4
Industrial	C	0.2	0.1
Total Area		770.1	18.7

The impervious area in the watershed is 18.7 acres or 2.42 % of the watershed area with the modified land use.



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Calculate Peak Runoff from the watershed

Burns Ditch & Trail Creek water... Burns Ditch & Trail Creek ... Burns Ditch & Trail Creek Sub-... Burns Ditch & Trail Creek water...

Watershed Summary and Tools

Land use before and after modification					
Land use	Soil group (Before)	Soil group (After)	Area(acres) (Before)	Area(acres) (After)	Area(acres) (Difference)
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Commercial	B	B	0.4	0.4	0
Commercial	C	C	3.4	3.4	0
Agriculture	B	B	43.2	43.2	0
Agriculture	C	C	659.9	660.7	+0.7
LD-Residential	B	B	2.7	2.7	0
LD-Residential	C	C	10.3	10.3	0
Grass/Pasture	B	B	0.4	0.4	0
Grass/Pasture	C	C	18.7	18.7	0
Forest	B	B	7.4	7.4	0
Forest	C	C	21.4	21.2	-0.1
Industrial	C	C	0.7	0.2	-0.5
Total area(ac)			770.1	770.1	0

BMP applied	Area (ac)
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Ag-Conservation Tillage	Applied to an area of 41.5
Sediment Basin	Contributing subwatershed area: 76.6
Grassed Waterways	Contributing subwatershed area: 68.5

Modeling Toolbox

- View watershed/Apply BMPs: Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply...
- Estimate sediment w/ BMP: Use this tool to estimate sediment yield (ton/acre) for the watershed. Universal delivery ratio...
- Estimate Imperviousness: Use this tool to estimate imperviousness for the watershed. Use this tool to estimate imperviousness...
- Estimate Peak Runoff**: Use this tool to estimate peak runoff for the watershed. (compute runoff concentration corresponding rainfall depth for the watershed).
- Run L-THIA Model: The Long-Term Hydrologic Impact Assessment Model estimates average annual runoff and nonpoint source pollutant levels in the watershed.
- Run SEDSPEC Model: The Sediment and Erosion Control Planning, Design and SPECification Information and Guidance tool allows user to design a channel, culvert, sediment basin, level terraces, runoff diversion, or low water crossing for the watershed.

Download data for the delineated watershed [Metadata](#)

- Watershed data (boundary, landuse raster etc) from this site (Purdue ABE)

Watershed Delineation Program by Tong Zhai, Bernard A. Engel, Rick Farnsworth

Rational method gives: 202.9 cfs

The depth of runoff is: 0.53 in

Time of concentration is: 62 minutes

Corresponding rainfall intensity is: 1.89 in/hr



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Run Long-Term Hydrologic Impact Assessment (LTHIA) to estimate runoff and NPS before and after landuse

Burns Ditch & Trail Creek... Burns Ditch & Trail Cr... Burns Ditch & Trail Creek... Burns Ditch & Trail Creek... Results

Watershed Summary and Tools

Land use before and after modification					
Land use	Soil group (Before)	Soil group (After)	Area(acres) (Before)	Area(acres) (After)	Area(acres) (Difference)
Water	B	B	0.9	0.9	0
Commercial	B	B	0.4	0.4	0
Commercial	C	C	3.4	3.4	0
Agriculture	B	B	43.2	43.2	0
Agriculture	C	C	659.9	660.7	+0.7
LD-Residential	B	B	2.7	2.7	0
LD-Residential	C	C	10.3	10.3	0
Grass/Pasture	B	B	0.4	0.4	0
Grass/Pasture	C	C	18.7	18.7	0
Forest	B	B	7.4	7.4	0
Forest	C	C	21.4	21.2	-0.1
Industrial	C	C	0.7	0.2	-0.5
Total area(ac)			770.1	770.1	0

BMP applied	Area (ac)
Ag-No Till	Applied to an area of 68.5
Ag-Reduced Till	Applied to an area of 65.6
Ag-No Till	Applied to an area of 88.6
Ag-Conservation Tillage	Applied to an area of 41.5
Sediment Basin	Contributing subwatershed area:76.6
Grassed Waterways	Contributing subwatershed area:68.5

Modeling Toolbox

View watershed/Apply BMPs	Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply structural BMPs in the watershed.
Estimate sediment w/ BMP	Use this tool to estimate long-term average annual sediment yield (tons/year) from the watershed using the <u>R</u> evised <u>U</u> niversal <u>S</u> oil <u>L</u> oss <u>E</u> quation (RUSLE) and the sediment delivery ratio approach.
Estimate Imperviousness	Use this tool to estimate percent imperviousness in the watershed.
Estimate Peak Runoff	Use this tool to estimate the peak rate of runoff, depth of runoff (computed using the SCS CN method), computed time of concentration (using the Kirpich formula), and the corresponding rainfall depth for the watershed.
Run L-THIA Model	The <u>L</u> ong- <u>T</u> erm <u>H</u> ydrologic <u>I</u> mpact <u>A</u> ssessment Model estimates average annual runoff and nonpoint source pollutant levels in the watershed.
Run SEDSPEC Model	The <u>S</u> ediment and <u>E</u> rosion Control Planning, Design and <u>S</u> PECification Information and Guidance tool allows user to design a channel, culvert, sediment basin, level terraces, runoff diversion, or low water crossing for the watershed.

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Run SEDSPEC model for structure design...

Burns Ditch & Trail ... Burns Ditch & Tr... Burns Ditch & Trail ... Burns Ditch & Trail ... Results L-THIA output

Watershed Summary and Tools

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Land use	Soil group (Before)	Soil group (After)	Area(acres) (Before)	Area(acres) (After)	Area(acres) (Difference)
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Commercial	B	B	0.4	0.4	0
Commercial	C	C	3.4	3.4	0
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Modeling Toolbox

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Estimate sediment w/ BMP	Use this tool to estimate long-term average annual sediment yield (tons/year) from the watershed using the Revised Universal Soil Loss Equation (RUSLE) and the sediment delivery ratio approach.
Estimate Imperviousness	Use this tool to estimate percent imperviousness in the watershed.
Estimate Peak Runoff	Use this tool to estimate the peak rate of runoff, depth of runoff (computed using the SCS CN method), computed time of concentration (using the Kirpich formula), and the corresponding rainfall depth for the watershed.
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QUESTIONS?

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